

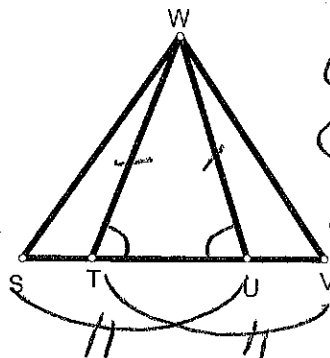
Name

Key

Isosceles Triangle proofs

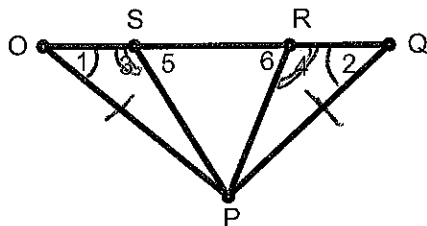
Date

1. Given: $\overline{WT} \cong \overline{WU}$ and
 $\overline{SU} \cong \overline{VT}$
 Prove: $\triangle SUW \cong \triangle VTW$



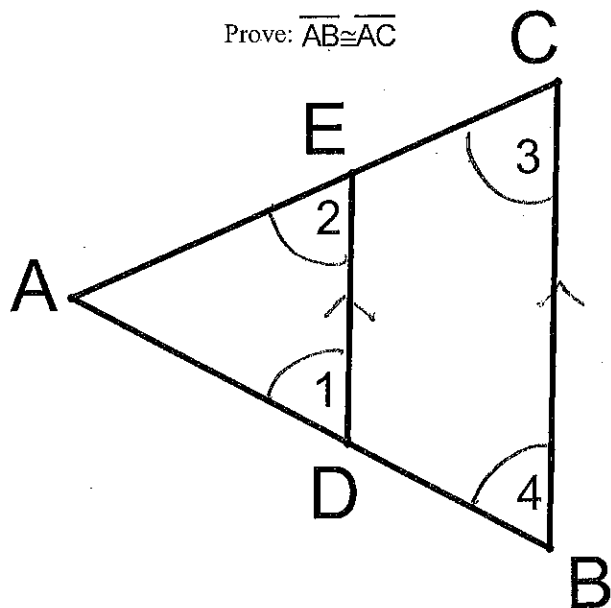
Statements	Reasons
① $\overline{WT} \cong \overline{WU}$	① Given
② $\angle WTU \cong \angle WUT$	② $\perp \Delta$ Thm
③ $\triangle SUW \cong \triangle VTW$	③ SAS

2. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$
 $\triangle OPS \cong \triangle QPR$
 Prove: ~~$\triangle OPS \cong \triangle QPR$~~



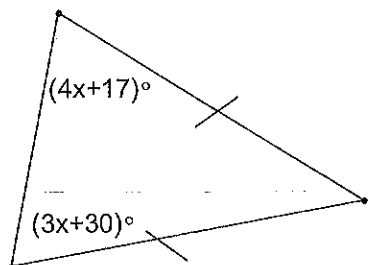
Statements	Reasons
① $\overline{OP} \cong \overline{QP}$	① Given
② $\overline{OP} \cong \overline{QP}$	② Conv. $\perp \Delta$ Thm
③ $\triangle OPS \cong \triangle QPR$	③ AAS

3. Given: $\angle 1 \cong \angle 2$; $\overline{DE} \parallel \overline{BC}$

Prove: $\overline{AB} \cong \overline{AC}$ 

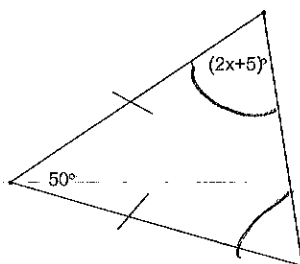
Statements	Reasons
① $\overline{DE} \parallel \overline{BC}$	① Given
② $\angle 1 \cong \angle 2$ $\angle 2 \cong \angle 3$	② If \parallel corr \angle s \cong
③ $\angle 1 \cong \angle 3$	③ Subst
④ $\overline{AB} \cong \overline{AC}$	④ Conv. $\perp \Delta$ Thm

Isosceles Triangle Theorem and the Converse

Solve for x . Show all work.4. 13

$$4x + 17 = 3x + 30$$

$$x = 13$$

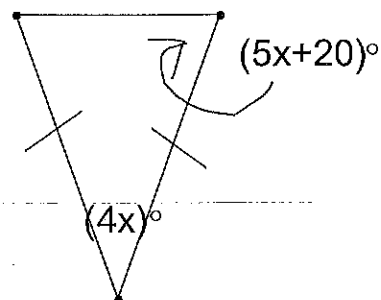
5. 30

$$2(2x + 5) + 50 = 180$$

$$4x + 10 = 130$$

$$4x = 120$$

$$x = 30$$

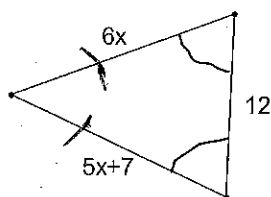
6. 10

$$2(5x + 20) + 4x = 180$$

$$10x + 40$$

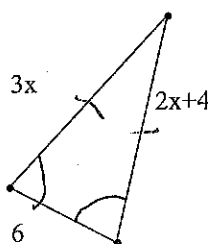
$$14x = 140$$

$$x = 10$$

7. 7

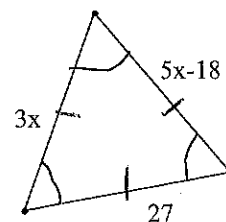
$$6x = 5x + 7$$

$$x = 7$$

8. 4

$$3x = 2x + 4$$

$$x = 4$$

9. 9

$$3x = 27$$

$$x = 9$$

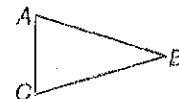
4-6

Study Guide and Intervention

Isosceles Triangles

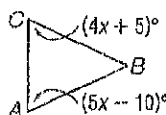
Properties of Isosceles Triangles An isosceles triangle has two congruent sides. The angle formed by these sides is called the **vertex angle**. The other two angles are called **base angles**. You can prove a theorem and its converse about isosceles triangles.

- If two sides of a triangle are congruent, then the angles opposite those sides are congruent. (**Isosceles Triangle Theorem**)
- If two angles of a triangle are congruent, then the sides opposite those angles are congruent.



If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong \angle C$.

If $\angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC}$.

Example 1Find x , given $\overline{BC} \cong \overline{BA}$.

$BC = BA$, so

$$m\angle A = m\angle C.$$

Isos. Triangle Theorem

$$5x - 10 = 4x + 5$$

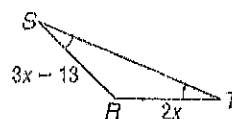
Substitution

$$x - 10 = 5$$

Subtract $4x$ from each side.

$$x = 15$$

Add 10 to each side.

Example 2Find x .

$m\angle S = m\angle T$, so

$$SR = TR.$$

Converse of Isos. Δ Thm.

$$3x - 13 = 2x$$

Substitution

$$3x = 2x + 13$$

Add 13 to each side.

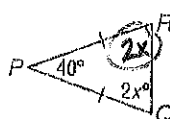
$$x = 13$$

Subtract $2x$ from each side.

ExercisesFind x .

$$4x + 40 = 180$$

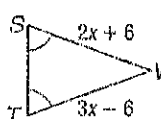
1.



$$4x = 140$$

$$x = 35$$

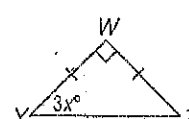
2.



$$2x + 6 = 3x - 6$$

$$12 = x$$

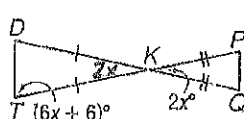
3.



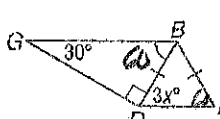
$$3x = 45$$

$$x = 15$$

4.



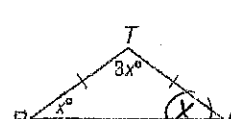
5.



$$3x = 66$$

$$x = 22$$

6.



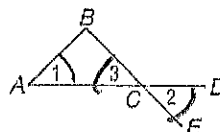
$$5x = 180$$

$$x = 36$$

7. Write a two-column proof.

Given: $\angle 1 \cong \angle 2$

Prove: $\overline{AB} \cong \overline{CB}$



Statements

Reasons

$$\textcircled{1} \sim \angle 1 \cong \angle 2$$

$\textcircled{1}$ Given

$$\textcircled{2} \angle 2 \cong \angle 3$$

$\textcircled{2}$ Vert \angle s \cong

$$\textcircled{3} \angle 1 \cong \angle 3$$

$\textcircled{3}$ Trans.

$$\textcircled{4} \overline{AB} \cong \overline{CB}$$

$\textcircled{4}$ Conv. of I Δ Thm

4-6 Skills Practice

Isosceles Triangles

Refer to the figure.

1. If $\overline{AC} \cong \overline{AD}$, name two congruent angles.

$$\angle D \cong \angle ACD$$

2. If $\overline{BE} \cong \overline{BC}$, name two congruent angles.

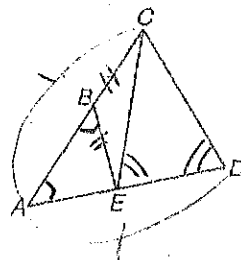
$$\angle BEC \cong \angle BCE$$

3. If $\angle EBA \cong \angle EAB$, name two congruent segments.

$$\overline{EB} \cong \overline{EA}$$

4. If $\angle CED \cong \angle CDE$, name two congruent segments.

$$\overline{CE} \cong \overline{CD}$$



$\triangle ABF$ is isosceles, $\triangle CDF$ is equilateral, and $m\angle AFD = 150$. Find each measure.

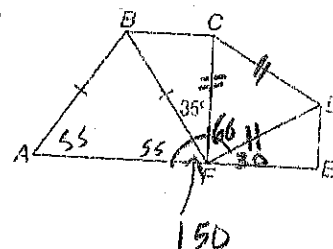
5. $m\angle CFD$ 60°

6. $m\angle AFB = 55^\circ$

7. $m\angle ABF$ 70°

$$\begin{array}{r} 55 \\ + 55 \\ \hline 110 \end{array}$$

8. $m\angle A = 55^\circ$



In the figure, $\overline{PL} \cong \overline{RL}$ and $\overline{LR} \cong \overline{BR}$.

9. If $m\angle RLP = 100$, find $m\angle BRL$. 20°

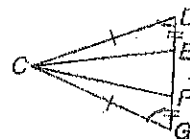
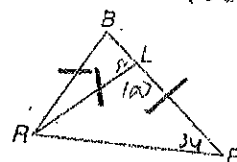
10. If $m\angle LPR = 34$, find $m\angle B$. 68°

11. Write a two-column proof.

Given: $\overline{CD} \cong \overline{CG}$

$\overline{DE} \cong \overline{GF}$

Prove: $\overline{CE} \cong \overline{CF}$



① ~

② $\angle D \cong \angle G$

③ $\triangle CDE \cong \triangle CGF$

④ $\overline{CE} \cong \overline{CF}$

① Given

② Isosceles Triangle Theorem

③ SAS

④ CPCTC